

Bohdan KŘÍSA\*: *Pyrola californica* Křísa—A new  
amphi-pacific species of Japan

ビー・クリサ\*: 日本新産の *Pyrola californica* について

**Introduction** From the chorological view it has a distinctive and comparatively frequent area discontinuity in the North Pacific region. The disjunctions resulted probably from the geological and climatic changes during the late Tertiary and Pleistocene periods, cf. Löve 1967, which marked also the structure of the woody communities in the Palaeoholarctic. It may be believed that the Tertiary correlations and the climatic changes in the Pacific between the East Asia and North America created conditions for area disjunctions and, simultaneously, affected the character of the phytogeographic evolution of the corresponding taxa. I believe that the area disjunctions of the species of the genus *Pyrola* does not concern only the population genesis itself but that the secular succession of woody communities had an important part in it which, in the historic times, undoubtedly evoked and affected the regressive or rigid character of the areas of these taxa. This accounts also for the endotrophico-mycorrhizic relations to the woody plants, the existence of which being the result of a species bond mutual alleloparasitism but possesses no determining ratio in the speciation processes. From the Japanese region palynological data are known on the occurrence of woody plants in the Pliocene period (*Metasequoia* sp., *Pseudolarix* sp.), and also in the cold periods of Pleistocene, cf. Woldstedt 1965. However, the age of the elements of the glacial flora of the insular region of Japan is not clear, particularly of the distribution of subalpine coniferous forests (*Tsuga* sp., *Abies* sp., *Picea* sp.); according to climatic reconstructions it may be perhaps Mindel or Würm. Glaciation has been proved in the central part of the island of Honshu (Hida glacial=Würm) and in the island of Hokkaido (Riss). Not less important is the evolution of the Late Glacial and Post-Glacial vegetation not only on the Japanese islands but also in the adjacent East-Asiatic-Pacific insular and coastal region.

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**Special part** *P. californica*, a new species for the East Asiatic region, belongs to the series *Asarifoliae*, cf. Křisa 1965, 1966, with primary evolution centre in the Rocky Mts. of W. North America and approaching in features the Asiatic taxa of the ser. *Japonicae* and ser. *Incarnatae* with their area of expansion proceeding from the continental central Asiatic area through the whole Sino-Japanese florographic region eastward right to the Bering Sea (fig. 3). The amphi-pacific area represents thus the joining region for the holarctic extratropical species some of which (sect. *Chlorantha*) have circumpolar distribution. Very striking is the feature continuity of some east Asiatic species (ser. *Japonicae*) in the direction to the equatorial part of SE. Asia. The taxa from the area of the Indo-Malayan archipelago and the Philippines can be regarded as allochthonous migrants of the Pliocene or Pleistocene periods and, according to the course of the Palaeo-equatorial zone in the SE. Asia, cf. Maekawa 1968, it is possible to look for their origin in the continental Sino-Japanese region. *P. californica* is an oceanic amphi-pacific species which radiates probably into the continental surroundings of the Bering Sea from numerous coastal refugia of this region in the same way as it is with other species in this region, cf. Komarov 1927; Hultén 1937; Porsild 1951; Hämet-Ahti 1965.

The first one to mention on the probability of the presence of the N. American-Pacific taxa of the genus *Pyrola* in the East Asia was Andres 1914 who presumed the presence of the species *P. bracteata* on the Asiatic sub-continent. This species has an endemic character of distribution between California and British Columbia and does not reach the orohemiarctic vegetation zone even in the nearctic region. On the contrary, Ohwi 1965 states on the occurrence of the species *P. incarnata* in North America. From the above mentioned chorology it is evident that in the North Pacific area some infiltration of the palaeartic and nearctic taxa can occur, particularly of those with their areas concentrated in the coastal or insular refugia. The species *P. incarnata* is of a Siberian continental origin with a gradual expansion eastward where its area ends in the region of Kamchatka-Kurile-Hokkaido-Honshu and is represented, in this region, only by its nominal population. The follow-up of the herbarium material of the East Asia showed that also the new species *P. californica* was mistaken for this population. Below, I state the taxonomical relationship, the distinguishing

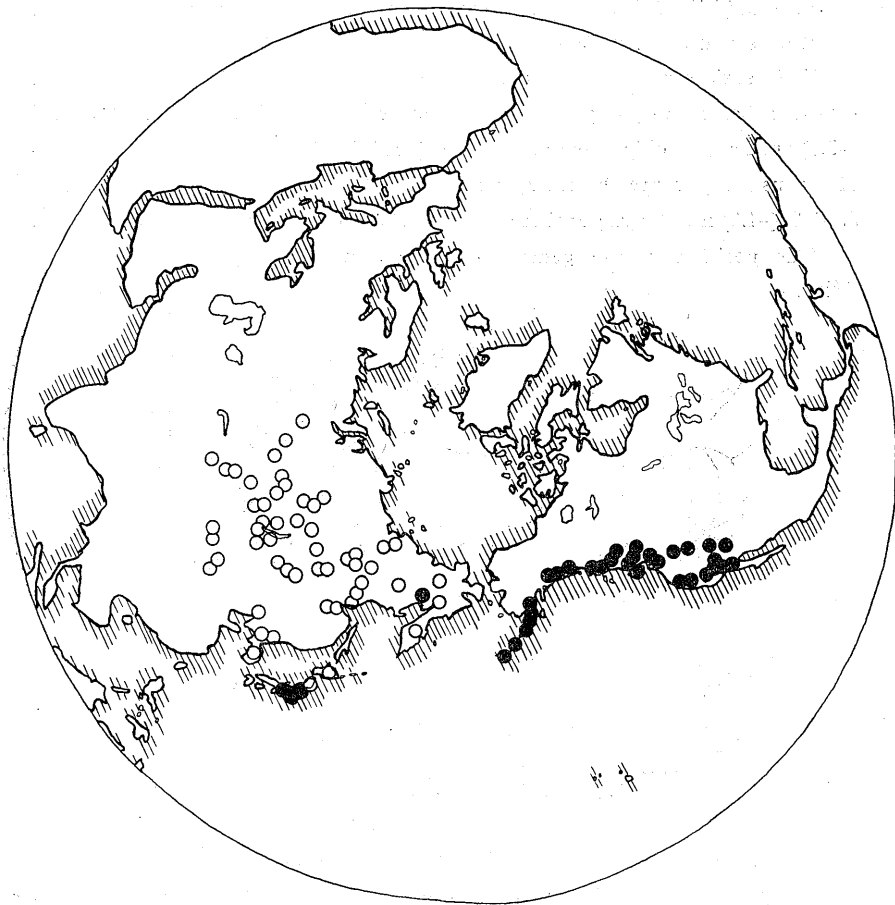


Fig. 1. Distribution map of investigated material of *P. californica* ● and of *P. incarnata* ssp. *incarnata* ○ in the holarctic region.

features and the type of distribution (figs. 1 and 2) of these two habitually close taxa:

***Pyrola incarnata*** Fisch. ex DC., Prodr. Syst. Nat. 7: 772, 1839.  
ssp. ***incarnata***.

*P. rotundifolia* L. var. *incarnata* DC., Prodr. Syst. Nat. 7: 773, 1839.

*P. rotundifolia* L. ssp. *incarnata* Krylov, Fl. Zap. Sib. 9: 2097, 1937.

*P. asarifolia* Michx. var. *purpurea* (Bunge) Fern., *Rhodora* 51: 103, 1949, sensu auct. fl. japon. p.p.

Folia satis tenuia, glauco-viridia, supra obscure viridia, paulum rubentia, subtus rubentia usque purpureo-brunnea, rotundata; laminae (1.5-) 2.5-4.5 (-5.0) cm longae, ellipticae; petioli (1.0-) 1.5-4.5 (-5.0) cm longi; sepala rubentia usque purpureo-brunnea, longe lanceolata vel ovato-lanceolata (2.8-) 3.3-3.8 (-4.3) mm longa; antherae (2.0-) 2.4-2.8 (-3.0) mm longae, purpureae.

The position in the generic system: sectio *Pyrola*, series *Incarnatae* Křisa.

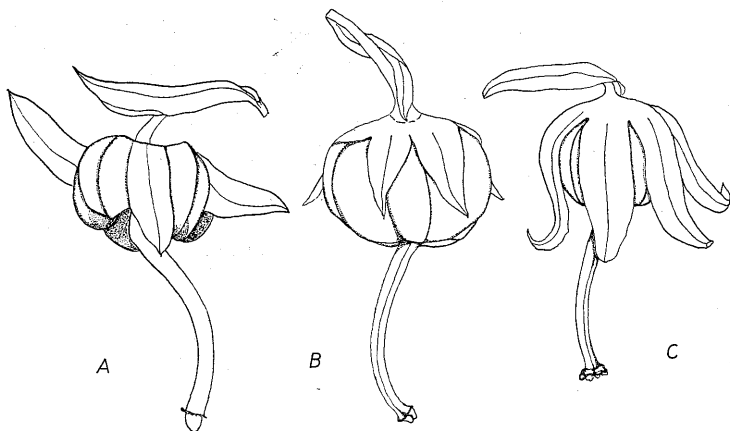


Fig. 2. A=*P. incarnata* ssp. *incarnata*; B=*P. californica*;  
C=*P. japonica*; young fruit.  $\times 3.3$ .

Area: the species is more or less continuously distributed from the lower Ob River estuary through the whole Siberia to the Yakutsk-Okhotsk region. To the southern direction from the Siberian area it grows in the North Mongolia and North China from the Kansu Province right to the Manchurian-Korean border, and the distribution continue farther to the Japan Islands and the Kuriles ending at Kamchatka Peninsula.

***Pyrola californica*** Křisa, Bot. Jb. 85: 615-621, 1966.

*P. asarifolia* Michx. Fl. Bor. Amer. 1: 251, 1803, sensu auct. fl. amer.

*P. asarifolia* Michx. var. *incarnata* Fern., *Rhodora* 6: 178, 1904.

*P. asarifolia* Michx. var. *purpurea* (Bunge) Fern., *Rhodora* 51: 103, 1949, p.p.

Folia e basi caulis excrecentia, longae petiolata, rotundata aut ovato-elliptica; laminae 4.0–6.0 cm latae, (2.0–) 5.0–6.0 (–7.0) cm longae eminenter nervatae, ad marginem crenatae; petioli (2.0–) 4.0–8.0 (–10.0) cm longi, sulcati; bracteae ovato-lanceolatae, pedicello aequilongae vel paulo longiores, purpureae, 4.5–7.5 mm longae; sepala ovato-lanceolata vel triangulo-ovata, dimidiam petalorum attingentia, (2.7–) 3.0–3.4 (–3.5) mm longa; antherae purpureae (2.5–) 2.7–2.9 (–3.0) mm longae.

The position in the generic system: sectio *Pyrola*, series *Asarifoliae* Křisa.

The distribution in the amphi-pacific area: Asia, specim. exam.: Japan: Prov. Kaga, Mt. Hakusan, 1964, sine coll. (E); Prov. Iwaki, in Zaimoku-iwa, 1924, S. Hayakawa (CAL); Prov. Shinano, Karuizawa, 1959, S. Kobayashi (MAK);—U.S.S.R.: Okhotsk-Kolyma region, forests along the Kolyma River, 1906, M. Anponova (LE).—North America: U.S.A.: California, Nevada, Colorado, Montana, Idaho, Oregon, Washington, Alaska (Pacific Coast Dist.) and Aleutian Islands; Canada: Brit. Columbia, Alberta.

The holarctic species of the nominal section *Pyrola*: ser. *Incarnatae*=*P. incarnata* Fisch. ex DC. ssp. *incarnata*, *P. incar.* ssp. *dahurica* (H. Andr.) Křisa, *P. norvegica* Knaben, *P. karakoramica* Křisa; ser. *Japonicae*=*P. japonica* Siebold, *P. alboreticulata* Hayata, *P. andresii* Křisa; ser. *Asarifoliae*=*P. asarifolia* Michx. ssp. *asarifolia*, *P. asar.* ssp. *americana* (Sweet) Křisa, *P. californica* Křisa, *P. bracteata* Hooker, differentiated undoubtedly from the Arcto-Tertiary floral complex. This taxogenetic assumption can be supported by the existing recent Arctic endemism which is typical particularly for wide species complexes in the Arctic, cf. Tolmatchev 1960. The species *P. incarnata* s. lat., *P. grandiflora* and *P. asarifolia* s. lat. can be designated, in the Tolmatchev's sense, as arctogenic species with a wide area which are phylogenetically more original in the Arctic. I consider these species as macro-endemic taxa, cf. Křisa 1967, which were in the Palaeoholarctic a part of the thermophil forest flora also in the polar regions and, during the Pleistocene, they differentiated as arctic-alpine populations in the total holarctic area. The existence of the epicontinental marine transgressions in the Palaeoholarctic during the Palaeogene and Neogene can, to a certain extent, explain, together with the Quaternary Glacials, the belief about the origin and distribution of primary evolutionary centres of the genus *Pyrola*.



Fig. 3. The map showing the distribution of the series of the nominal section *Pyrola* in the Northern Hemisphere. Ser. *Asarifoliae* (—); ser. *Incarnatae* (---); ser. *Japonicae* (....).

Starting from the assumption that the Arcto-Tertiary flora of Siberia formed an evolutionary centre for a consequent secular chorogenesis of the taxa of the *Pyrolaceae* family, we see that the biographic conditions of the above mentioned area already during the Tertiary must have been suitable especially as to the climatico-coenological way. The area florogenesis does not express only the evolution of the corresponding plant groups, but is likewise the

result of a long-term genesis of all biotic factors in the given area. The marine deluge in the Palaeogene connected with the drop of continents reached its maximum in the lower Oligocene when the successive transgression reached also the Russian plateau and formed a watershed between the west Siberian and east European continent.

The most extensive changes have occurred in the region Tethys in the whole area of geosyncline zone from the Alps to the Himalayas, and it is possible that the folding of the montane massifs of this part, and particularly in Asia affected the character of the florogenesis in the Turanian-Iranian and also in the Sino-Japanese florographic area. There were mostly oreophytic populations that the migration trend was directed N to S in Asia starting from the Arctic to the alpine positions of the central Siberian and central Asiatic massifs. The phenomenon, however, is not so distinctive in North America where the taxogenesis of the genus *Pyrola* represents rather more parallel branches between the arctic and montane area. From this it can be concluded that the character of the amphi-pacific region from the view of the florogenetic properties was, to a considerable extent, affected by the typical evolution of floral conditions on both sides of the holarctic part of the Pacific. It is probable that it was just the Beringian area which became the centre of the origin of boreal-arctic species. Some of which have attained the circumpolar distribution and the others have limited their occurrence within the North Pacific area.

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*Pyrola californica* Křisa は北アメリカのカリフォルニアから記載され、太平洋側地域ではアリューシャン列島まで北上している。これは Oroboreal から Orohemiarctic 植生帯にわたる区域に生育していることになる。本種はイチヤクソウ属イチヤクソウ節に分類されるものであるが、本節の東亜に産する種類の分類・分布学的研究を行ったところ、日本列島とソ連極東部（コリマ川流域）とに産することが判明した。即ち *P. californica* は amphi-pacific species ということが明かになったので、ここに報告する。

○高等植物分布資料 (63) Materials for the distribution of vascular plants in Japan (63).

○トウハナイバナ *Bothriospermum kusnezowii* Bunge トウハナイバナは朝鮮、満州、中国大陸に広く分布する植物である。台湾で *B. tenellum* var. *majusculum* Hayata とされているものはこれと同じである。この種は奄美大島にもあるように思われるが確認するまでにはいたっていない。

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